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Studies on the Rocky Mountain Flora—II

By P. A. Rydberg

THE ROCKY MOUNTAIN SPECIES OF MELANTHACEAE

There has been a great deal of misunderstanding regarding the species belonging to the family Melanthaceae (perhaps more commonly regarded as a sub-family of Liliaceae). Especially is this true with respect to the species growing in the Rocky Mountain region. In order that some of the confusion may be cleared up and a way may be opened to further study of the group my present views are here offered.

The family is represented in the Rockies by at least five genera and seventeen species. Of these I have found myself obliged to describe one genus and seven species as new. The genera are as follows :

TOFIELDIA Huds.

This is represented by three species, distinguished as follows :

Stem glabrous, scapose ; seeds unappendaged. *T. palustris.*
Stem viscid-pubescent at least above ; seeds appendaged.
    Bractlets broadly triangular, connate for two thirds of their length. *T. intermedia.*
    Bractlets lanceolate-triangular, connate half their length or less. *T. occidentalis.*

Tofieldia palustris Huds. Fl. Ang. Ed. 2, **1** : 175

A subalpine species of wet places, growing in America from Greenland to Alaska and from the Arctic coast south to Quebec and British Columbia. It is also found in subarctic Europe. The following specimen from the Rockies is in the New York Herbaria :

British Columbia : Rocky Mountains, 1890, *John Macoun.*

Tofieldia intermedia sp. nov.

Tofieldia glutinosa Hook. Fl. Bor. Am. **2** : 179, in part. 1838. Wats. Bot. Calif. **2** : 184. Not Pursh.

A slender perennial with more or less leafy stem, 1.5–3 dm. high, viscid-pubescent above. Leaves 5–20 cm. long, 2–5 mm. wide, obtuse or acute : raceme short, dense, 1–2 cm. long : bracts broad, ovate: pedicels usually 3 together, very short, in fruit 1–4 mm. long: bractlets under the flowers 3, broadly triangular, connate for about two thirds their length: flowers yellow: sepals obovate, 4–5 mm. long: petals somewhat narrower and longer: capsule ovoid, about 5 mm. long: beaks about 1 mm. long, spreading: seeds appendaged.

This has been confused with the eastern *T. glutinosa* Pers. which has an elongated raceme, longer pedicels, and oblong subequal sepals and petals, about 4 mm. long. All specimens from the west referred to *T. glutinosa* may belong to *T. intermedia*. At least all that I have seen do so. *T. intermedia* grows in bogs to an altitude of 2,700 m. from Saskatchewan to Alaska, British Columbia and Wyoming. The following specimens belong to it:

ALASKA: Sheh-Shooh Lake, 1895, *M. W. Gorman, 78* (type); Yes Bay, 1895, *Thos. Howell, 1666;* Khantaak Island, 1892, *F. Funston, 47;* Sitka, *Bongard.*

BRITISH COLUMBIA: Summit of Selkirk Mountains, 1890, *John Macoun.*

WASHINGTON: Totoish Mountains, 1897, *O. D. Allen 274.*(?)

MONTANA: Flathead River, 1892, *R. S. Williams, 915;* Granite, 1892, *Kelsey;* Upper Marias Pass, 1883, *Canby, 328.*

WYOMING: Cement Creek, 1897, *F. Tweedy, 336.*

TOFIELDIA OCCIDENTALIS Wats. Proc. Am. Acad. **14**: 283. 1879

This species is distinguished from the preceding by the narrower, less connate bractlets, longer pedicels, narrower sepals, larger capsule, 8 mm. long, and longer ascending beaks. The following specimen from the Rocky Mountain region is in the New York Herbaria.

BRITISH COLUMBIA: Avalanche Mountain, 1890, *J. M. Macoun.*

XEROPHYLLUM

This genus is represented by two species:

Petals and sepals 7–10 mm. long.	*X. tenax.*
Petals and sepals 4–6 mm. long.	*X. Douglasii.*

XEROPHYLLUM TENAX (Pursh) Nutt. Gen. Am. **1**: 235. 1818

Helonias tenax Pursh Fl. Am. Sept. 243. 1814.

X. Douglasii Rydb. Mem. N. Y. Bot. Gard. **1**: 92; not Wats.

This has been greatly confused with the following. Watson stated that *X. Douglasii* was collected on the Hayden Surveys of the Yellowstone Park, but does not cite any locality in the Rocky Mountains for *X. tenax*. Coulter in his Manual of the Rocky Mountain Region included consequently a description of the former, but none of the latter. As this book is the one most used by Rocky Mountain botanists, all specimens of *Xerophyllum* from that region have therefore been labeled *X. Douglasii.* I made the same mistake in preparing my Catalogue of the Flora of Montana. All the specimens cited there belong to *X. tenax* instead of *X. Douglasii.* Besides the Montana specimens there cited, the following Rocky Mountain specimens belong to this species:

BRITISH COLUMBIA: Toad Mountain, Kootenay Lake, 1890 *J. M. Macoun.*

IDAHO: Kootenay Co., 1888, *J. H. Saunders;* Wiessner's Peak, 1892, *Sandberg, MacDougal & Heller, 588.*

XEROPHYLLUM DOUGLASII Wats. Proc. Am. Acad. **14**: 284. 1879.

I have not seen any Rocky Mountain specimen of this species, but include it on the authority of Dr. Watson who referred to it the specimens from the Hayden Collection metioned above.

Stenanthella gen. nov.

Erect bulbous glabrous herbs with few narrow leaves and racemose or paniculate perfect greenish, brownish or purplish flowers. Petals and sepals each 3, subequal, withering-persistent, narrowly lanceolate, acuminate, with reflexed tips, and at last involute, without gland and distinct claw. Stamens 6, free, included; anthers reniform, confluently 1-celled. Ovary ovoid, superior; styles 3. Capsule lance-ovoid, 3-beaked, septicidal to the base, wholly superior. Seeds oblong, winged.

Dr. Gray included the species belonging here in *Stenanthium*, but the genus is better defined than many of the recognized genera in the family. In *Stenanthium*, the flowers are polygamous, open, not campanulate in outline, the base of the ovary is inferior, the tip of the petals and sepals not reflexed and the general habit different. The genus *Stenanthella* contains two known species, one from the island Sachalin, **S. Sachalinensis** (*Stenanthium Sachalinense* F. Schmidt), and the following:

Stenanthella occidentalis (A. Gray) Rydb. n. n.

Stenanthium occidentale A. Gray, Proc. Am. Acad. **8**: 405.

The species ranges from Alberta and British Columbia to Oregon and Idaho. The following specimens are from the Rockies:

MONTANA: Deer Lodge, 1892, *Miss Emma Ware;* Flathead River, 1883, *Canby, 332;* Big Blackfoot, *Canby;* divide between Hell Gate and Blackfoot, 1880, *Watson;* Columbia Falls, 1894, *R. S. Williams.*

ALBERTA AND BRITISH COLUMBIA: Rocky Mountains, 1858, *E. Bourgeau;* Kicking Horse Lake, 1887, *John Macoun.*

IDAHO: Kootenay Co., 1890, *J. B. Leiberg, 4912.*

VERATRUM L.

Flowers greenish, bractlets foliaceous, often equaling or exceeding the flowers. *V. viride.*

Flowers white or yellowish white; bractlets membranous, much shorter than the pedicels and flowers. *V. speciosum.*

VERATRUM VIRIDE Ait. Hort. Kew. **3**: 422. 1789

V. lobelianum β Eschscholtzianum R. & S. Syst. **7**: 1555. 1829.

V. Eschscholtzii Gray, Ann. Lyc. N. Y. **4**: 119. 1837.

If the western plant should be included in *V. viride* or not, is doubtful. The eastern plant extends west to Minnesota and the western is found first on the Pacific slope in Idaho and British Columbia. Both are very variable and no good character has been found to separate the two. As a rule the western plant has shorter stamens and bracts; the former scarcely half as long as the petals and sepals. The western range of *V. viride* or *V. Eschscholtzianum,* whatever name it should bear, is from southern Alaska to Oregon and Idaho. The following are the only specimens seen from the Rockies.

IDAHO: Packsaddle Peak, 1892, *Sandberg, MacDougal & Heller, 863.*

Veratrum speciosum sp. nov.

Veratrum Californicum Wats. Proc. Am. Acad. **14**: 277; in part. 1879. Not Durand.

A stout, more or less pubescent, very leafy plant, 1–3 m. high. Leaves, except the uppermost, broadly oval, 2–3 dm. long, 1–2 dm. wide, obtuse or acute, glabrous above, finely soft-pubescent beneath, sessile and sheathing: panicle many-flowered with ascending branches: bracts lanceolate, foliaceous: bractlets membranous, yellowish, ovate, acuminate, shorter than the flowers and pedicels: petals and sepals yellowish white, oval or broadly oblanceolate, mostly obtuse, 5–7-nerved, 8–10 mm. long, 4–5 mm. wide: capsule oblong, about 3 cm. long and 12 mm. in diameter: seeds oblong, 7–8 mm. long with a wide white wing-margin.

In looking over the specimens of *V. Californicum* in the Columbia Herbarium I found one specimen collected in Oregon on the Wilkes' Expedition, which looked very unlike the rest, having a narrower and denser panicle and narrower and more acutish petals and sepals. I took it out and placed it in the cover used for the specimens not named. I found in that cover a similar specimen. On the label was given neither locality nor the collector's name; but on the sheet was pasted a paper with a tracing of the basal leaves, the description of *V. Californicum* E. Durand and some remarks, among others the words "petiole 3–4 inches long." The specimens are presumably a part of the type of *V. Californicum* or at least have been compared with Durand's specimens and the notes made by Durand himself. Durand in his description expressively states that the lower stem-leaves are petioled. As this is never the case in the plant of the northern Rockies and the Columbia Valley, I am certain that the plant generally regarded as *V. Californicum* and from which Dr. Watson's description in his revision was mainly drawn is perfectly distinct from Durand's plant. The latter is a rare plant judging from the fact that I have not seen more than the two specimens mentioned above.

V. speciosum ranges from Montana to Washington, California and Colorado, reaching a maximum altitude of 2,500 m.

MONTANA: Bridger Mountains, 1896, *Flodman, 344* (type); Little Belt Mountains, *344½*; Bozeman, *P. Koch*; Deer Lodge Co., *Emma Ware*; Belt Park, 1886, *R. S. Williams, 475*; Belt Creek, 1883, *Scribner, 287*; Lo-Lo Creek, 1880, *Watson.*

IDAHO: Lake Pend d'Oreille, 1892, *Sandberg, MacDougal & Heller, 741*; Kootenay Co., 1886, *J. H. Sandberg*; Lake Waha, 1896, *A. A. & E. Gertrude Heller, 3380*; 1892, *Isabel Mulford.*

UTAH: Heber Valley, 1869, *S. Watson, 1165*; American Fork Cañon, 1880, *M. E. Jones.*

WASHINGTON: 1889, *G. R. Vasey.*

OREGON: *J. S. Newberry.*

CALIFORNIA: Modoc Co., 1893, *M. S. Baker;* 1865, *H. N. Bolander, 6255;* Mt. Shasta, 1897, *H. E. Brown.*

COLORADO: Pagosa Peak, 1899, *C. F. Baker, 258* (?). (This has smaller flowers, petals and sepals being only 6–8 mm. long.)

ZYGADENUS Michx.

Much confusion has existed in this genus. The species of Colorado, Wyoming and Montana have been variously named *Z. Nuttallii*, *Z. venenosus* and more rarely *Z. paniculatus*, but much complaint has been made that they do not fit Watson's descriptions. Some have complained that those descriptions have been too narrow, others that there is no line to be drawn between *Z. venenosus* and *Z. paniculatus* and that both those species come too near *Z. Nuttallii.* Dr. Watson's descriptions of *Z. venenosus* and *Z. paniculatus* are unusually good and correct. He knew them both from the field. The common Rocky Mountain plants belong to neither. *Z. venenosus* does not grow east of Idaho and *Z. paniculatus* not east of Utah, while *Z. Nuttallii* is a species of the plains and I doubt that it is found at all in the Rocky Mountain States. The Rocky Mountain species are distinguished as follows:

- Gland obcordate; base of ovary inferior.
  - Petals and sepals 7–8 mm. long, 7–13-nerved. *Z. elegans.*
  - Petals and sepals 5–6 mm. long, 3–7-nerved. *Z. Coloradensis.*
- Gland obovate or semi-orbicular; ovary wholly superior.
  - Petals and sepals more or less clawed; filaments adnate to the base of the claws.
    - Petals and sepals rounded or obtuse at the apex.
      - Upper leaves without sheaths at the base; both petals and sepals long-clawed and sub-cordate at the base*; gland with a thick margin. *Z. venenosus.*
      - All leaves with distinct sheaths; petals long-clawed and sub-cordate at the base; sepals short-clawed; margin of the gland ill-defined.
        - Petals and sepals 4–5 mm. long; petals ovate; leaves 3–5 mm. wide. *Z. gramineus.*
        - Petals and sepals 6–8 mm. long; petals oblong; leaves 5–9 mm. wide. *Z. intermedius.*
    - Petals and sepals acute or acuminate at the apex; all leaves with sheaths; sepals cuneate at the base and short-clawed.
      - Leaves less than 5 mm. wide; petals and sepals both cuneate at the base and short-clawed. *Z. acutus.*

Leaves over 5 mm. wide.
    Raceme simple; petals long-clawed and sub-cordate at the base. *Z. falcatum.*
    Raceme branched; petals short-clawed, not sub-cordate at the base. *Z. paniculatum.*
Petals and sepals clawless; gland obovate with a poorly defined margin; filaments free. *Z. Nuttallii.*

ZYGADENUS ELEGANS Pursh, Fl. Am. Sept. **1**: 241. 1814

The typical *Z. elegans* is a western plant, mainly belonging to the Rocky Mountain region, where it grows in meadows up to an altitude of 2500 m. If the eastern plant or *Z. glaucus* of Nuttall, should be included in this species, is very doubtful. It is always darker green, more glaucous, inflorescence more paniculately branched, the petals and sepals narrower and more greenish. It ranges from New Brunswick to Minnesota and south to Vermont. The range of *Z. elegans* proper is from Saskatchewan to Alaska, south to Colorado and Nevada.

Zygadenus Coloradensis sp. nov.

A rather slender glabrous plant, 2–4 dm. high. Bulb ovoid, about 2 cm. long and 1–1.5 cm. in diameter: leaves narrow, erect, about 2 dm. long, 3–5 mm. wide: flowers racemose, yellowish white-tinged with brownish or purplish: bracts linear-lanceolate, all equaling or exceeding the pedicels: petals and sepals 5–6 mm. long, 3–7-nerved, oblong or narrowly obovate, acute: capsule ovoid, 15–18 mm. long and 7–8 mm. in diameter.

Z. Coloradensis is closely allied to *Z. elegans*, differing in the smaller flowers, greener foliage, long and narrow bracts equaling or exceeding the pedicels and a brownish or purplish tint of the inflorescence, bracts and flowers. It grows in the mountains at an altitude of 2500–3500 m.

COLORADO: Idaho Springs, 1895, *Rydberg* (type); Leroux Creek, 1892, *J. H. Cowen;* La Plata, 1873, *Coulter;* Caribou, 1891, *Dr. E. Penard;* Empire, 1892, *H. N. Patterson, 298.*

ZYGADENUS VENENOSUS Wats. Proc. Am. Acad. **14**: 279. 1879

This species is characterized by its narrow leaves, of which the upper lack the scarious sheaths, and by the thick, prominent glands. It is more slender and strict than all the species except *Z. acutus*, which is easily distinguished by its acute sepals and petals. *Z. venenosus* grows mostly on hillsides at low altitudes, scarcely ascending higher than 2000 m. It ranges from Idaho and British Columbia to California and Utah. The following Rocky Mountain specimens belong here:

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* When the petals or sepals are sub-cordate at the base and long-clawed the gland is at the very base but when they are acute at the base the gland is a little higher up on the blade.

UTAH: Parley's Peak, 1869, *S. Watson, 1163.*

IDAHO: Keeley's Hot Springs, 1892, *Isabel Mulford;* Big Potlash River, 1892, *Sandberg, MacDougal & Heller, 319;* Little Potlash River, *404.*

Zygadenus gramineus sp. nov.

Zygadenus venenosus Rydb. Cont. U. Dep. Ag. **3**: 525. 1896. Mem. N. Y. Bot. Gard. **1**: 93 in part. Not S. Wats.

A slender yellowish-green plant, 2–3.5 dm. high. Bulb elongated ovoid, 2–3 cm. long and 1–1.5 cm. in diameter: leaves narrowly linear, scabrous on the margins and the midrib, 1–2 dm. long, 3–5 mm. wide, conduplicate and somewhat falcate, all with distinct scarious sheaths surrounding the stem: racemes rather short: bracts scarious, lanceolate, long-acuminate: flowers light yellow: sepals broadly ovate, obtuse at the apex, acute at the base and very short-clawed: petals ovate, obtuse, subcordate at the base and with claws about 1 mm. long: glands almost semi-orbicular; upper margin toothed, but thin and not well defined: capsule elongated ovoid, 8–10 mm. long, 3–4 mm. in diameter.

Z. gramineus resembles somewhat the preceding, but is lower, of a yellowish color; its stem leaves are evidently sheathed, the sepals are short clawed, not subcordate at the base and the gland thin and without a distinctly thickened upper border. *Z. gramineus* grows on hillsides up to an altitude of 2500 m.; from Saskatchewan and Alberta, south to western Nebraska and Idaho.

MONTANA: Spanish Basin, 1897, *Rydberg & Bessey, 3848* (type); 1896, *Flodman, 343;* Helena, 1891, *F. D. Kelsey.*

IDAHO: Beaver Cañon, 1895, *Rydberg.*

SOUTH DAKOTA: Hot Springs, 1892, *Rydberg, 1051.*

WYOMING: Yellowstone Park, 1888, *Dr. Chas. H. Hall.*

SASKATCHEWAN: 1858, *E. Bourgeau.*

Zygadenus intermedius sp. nov.

Zygadenus venenosus Rydberg, Mem. N. Y. Bot. Gard. **1**: 93 in part. 1900. Not Nutt.

A rather stout light green plant, 3–6 dm. high. Bulb elongated ovoid, about 3 cm. long and 1.5 cm. in diameter: leaves scabrous on the midrib and margins, 2 dm. or more long, 5–9 mm. wide, keeled and sometimes conduplicate; all with conspicuous scarious sheaths at the base: raceme rather long: flowers light yellow; petal and sepals 6–8 mm. long, obtuse; the former broadly ovate, and acute or rounded at the base and short-clawed; the latter oblong subcordate at the base and with a claw 1 mm. long: glands as in the preceding.

Like the preceding but taller and stouter, in habit resembling mostly *Z. paniculatus*, except that the inflorescence is seldom branched. It is easily distinguished from that species by the obtuse petals and sepals and by the distinct claws and the subcordate bases of the petals. It grows on dry hillsides up to an altitude of 2000 m. in Montana, Idaho, Wyoming and Utah.

IDAHO: Nez Perces Co., 1892, *J. H. Sandberg, 10564* (type); Peter Creek, 1892, *Sandberg, MacDougal & Heller, 114;* Lewiston, 1896, *A. A. & E. Gertrude Heller, 3093.*

UTAH: Farmington, 1881, *M. E. Jones, 2091.*

WYOMING: Laramie Hills, 1894, *Aven Nelson, 254.*

MONTANA: Deer Lodge, 1895, *F. N. Notestein;* Bridger Mountains, 1897, *Rydberg & Bessey, 3849.*

Zygadenus acutus sp. nov.

A very slender light green plant, 3–5 dm. high. Bulb rounded ovate, 1.5–2 cm. long, 1–1.5 cm. in diameter: leaves narrowly linear, scabrous on the margin, about 2 dm. long and 4–5 mm. wide, keeled and often conduplicate: flowers pale yellow: petals and sepals 4–5 mm. long; both acute at the apex and at the base, very short-clawed: glands obovate or cuneate; upper margin toothed, thin and not well defined.

In habit closely resembling *Z. venenosus*, but easily distinguished by the acute, short-clawed petals and sepals, which are both cuneate at the base. The only specimens seen are the following:

SOUTH DAKOTA: Box Elder Creek, Black Hills, 1887, *W. S. Rusby.*

Zygadenus falcatus sp. nov.

Z. Nuttallii Porter & Coult. Syn. Fl. Colo. 133. In part. 1874. Not A. Gray.

A rather stout light green plant 3–4 dm. high. Bulbs rounded ovoid, 3–4 cm. long and about 3 cm. in diameter: leaves scabrous, especially on the margins and midribs, 1.5–2.5 dm. long, 5–8 mm. wide, keeled, conduplicate, and generally decidedly falcate, all with scarious sheaths: raceme short, in fruit elongated: flowers yellow: petals and sepals about 5 mm. long, acute; the former deltoid ovate, acute at the base; the latter ovate, sub-cordate at the base and with claws 1 mm. long: glands semi-orbicular, upper margin toothed, thin and not well defined: capsule ovoid cylindrical.

All the specimens cited below have been named *Z. Nuttallii* though the plant is more closely related to *Z. paniculatus*, from which it differs in the distinctly clawed petals which are subcordate at the base. These characters, together with the more distinct glands and the slightly adnate filaments, distinguish it from *Z. Nuttallii*. *Z. falcatus* inhabits the foothills of Colorado at an altitude of about 1500 m.

COLORADO: Fort Collins, 1893, *C. S. Crandall* (type); 1896. *C. F. Baker;* Denver, 1873, *J. M. Coulter.*

ZYGADENUS PANICULATUS (Nutt.) Wats. Bot. King's Exp. **5**: 343, 1871

Helonias paniculata Nutt. Journ. Phila. Acad. **7**: 57. 1834.

It is well characterized by Watson and easily distinguished by its stout habit, generally branched inflorescence, and rhombic-ovate acute and almost clawless petals and sepals. It grows on hills up to an altitude of 1500 m., ranging from Montana and Washington to New Mexico and California. The following Rocky Mountain specimens belong here:

UTAH: Ogden, *Capt. Stansbury;* City Creek Cañon, 1880, *M. E. Jones, 1674.*

IDAHO: Boise, 1892, *Isabel Mulford.*

MONTANA: Grasshopper Valley, 1880, *Watson* (?).

ZYGADENUS NUTTALLII A. Gray, in Wats. Proc. Am. Acad. **14**: 279. 1879

Amianthium Nuttallii Gray, Ann. Lyc. N. Y. **4**: 123.

This is evidently a species belonging to the plains. All the specimens in the Columbia and N. Y. Botanical Garden herbaria are from Arkansas and Kansas. Dr. Watson included Texas and

Colorado in the range. The Texan plant referred here by him, belongs to an altogether different plant. I think that Colorado also should be excluded, believing that all specimens found there and labeled *Z. Nuttallii* belong to *Z. falcatus*, which resembles it most in general habit, but has an altogether different flower.